Mechelecív

VOL. 16 NO. 2

IN THIS ISSUE:

- TOMPKINS HALL OF ENGINEERING

SCHOOL OF ENGINEERING
THE GEORGE WASHINGTON UNIVERSITY

NOVEMBER 1956

Leroy J. Sauter, class of '49, speaks from experience when he says:

"The variety of jobs open to engineers with United States Steel offers satisfaction and a great future."

IN 1949, Leroy J. Sauter was graduated from the University of Pittsburgh with a B.S. in Metallurgical Engineering. Today, Mr. Sauter holds the important post of Superintendent, Open Hearth and Bessemer Department at National Works of United States Steel's National Tube Division.

Before his college days, and as far back as October, 1939, Mr. Sauter was employed as a chipper, a molding helper, and helper on an electric furnace at the United States Steel's Johnstown Works. Then, from 1943 until 1945, he served in the U. S. Navy. He entered the University of Pittsburgh in 1946, graduating within three years.

In February of 1949, Mr. Sauter was employed by United States Steel as a student engineer. In October, 1950, he became a process engineer in the Open Hearth and Bessemer Department. In April, 1952, he was advanced to practice engineer in the same department, and three months later, July, 1952, Mr. Sauter was appointed Assistant Superintendent of the Open Hearth and Bessemer Department. His elevation to his present position of Superintendent of this department occurred in December, 1955.

Today, Mr. Sauter supervises 316 men, being responsible for and assuring the productivity, quality of product, and general morale of this group. His responsibility further extends to the complete operation of his department, operating costs, meeting ingot requirements and complete scheduling of equipment.

Mr. Sauter's rapid advancement is not unusual at United States Steel. USS training programs make it possible for men of vision and energy to reach responsible goals within a minimum of time. Mr. Sauter says, "With the vast expansion of the steel industry, opportunities to men presently graduating from colleges and universities throughout the country as engineers are unlimited. United States Steel offers such engineers the opportunity to practice using a large variety and range of specific engineering talents. In the steel industry practically every craft known to man is utilized."

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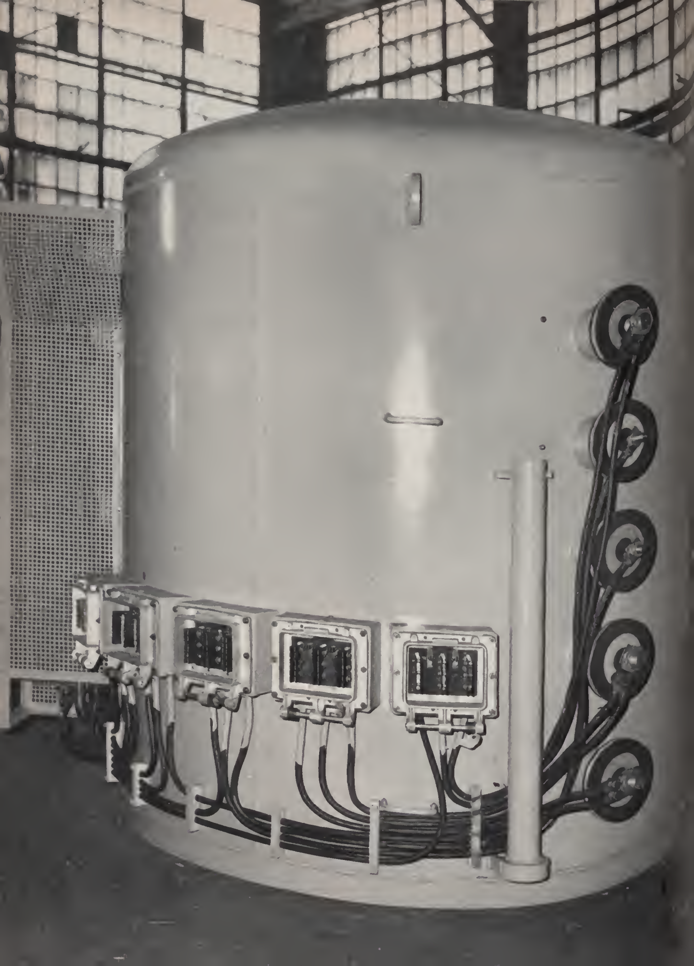

the Mechelecív

VOL. 16 NOVEMBER 1956 NO. 2

SCHOOL OF ENGINEERING, THE GEORGE WASHINGTON UNIVERSITY

IN THIS ISSUE

DEPARTMENTS

ON OUR COVER

Tompkins Hall of Engineering —Davis Studio Photo

FRONTISPIECE

Westinghouse 210 kw electric furnace which converts liquid titanium tetrachloride to sponge titanium. —*Cut courtesy Westinghouse*

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MARTIN
BALTIMORE

The New Laboratories In Tompkins Hall of Engineering

By Prof. Carl H. Walther
Executive Officer of the Civil Engineering Department

Probably the first impression one gets on entering one of the completed new laboratories in Tompkins Hall is that of space and light. This feeling of "roominess" is no doubt caused partly by the contrast with our previous cramped quarters that were so familiar to alumni and most students. But it is mainly due to previous planning of architectural and technical details.

A second impression that one gains, after studying the arrangement and equipment of the laboratories, is that these rooms are likely to be comfortable and convenient to work in. This is, again, the result of careful planning. The air-conditioning promotes greater comfort, of course, but convenience depends largely on the arrangement of equipment and availability of building services.

The size of the job that is involved in planning and setting up the laboratories is shown by the statistics. We shall have, ultimately, fourteen regular laboratories, plus four drawing or design laboratories. In addition, four rooms are set aside for graduate laboratories. Each laboratory is housed in a separate room, in striking contrast to our old quarters, where sometimes several laboratory courses made use of the same room and equipment.

Most laboratories, like the classrooms and offices, in Tompkins Hall are individually air-conditioned. The room air-conditioning units draw fresh air in from outside the building and mix it with a controlled amount of recirculated air from the room. Depending on the season, hot or cold water is piped from the central air-conditioning machinery to the room units, where it warms or cools the fresh air passing over a heat exchanger in each unit.

Laboratories below ground level, in the basement and mezzanine floors, are generally not air-conditioned. Instead, they have conventional radiators and ventilating fans installed. An exception is the central group of rooms in the mezzanine, consisting of a calorimetry laboratory, moist room for curing concrete specimens, and a photographic dark room; these have their own small air-conditioning system. These rooms are thus isolated, thermally, from the remainder of the building and may be maintained at a different temperature.

In planning for Tompkins Hall every effort was made to provide maximum flexibility in future use. Any classroom may readily be converted to a laboratory, if the need should arise. Partitions are of cinder block and can be removed or installed quickly. Vertical risers for all services: hot and cold water, gas, and compressed air, are run from basement to roof. Connections to these, already valved, are provided near each end of the building on every floor. It will therefore be a simple matter to make the necessary connections to serve any laboratory that may be set up.

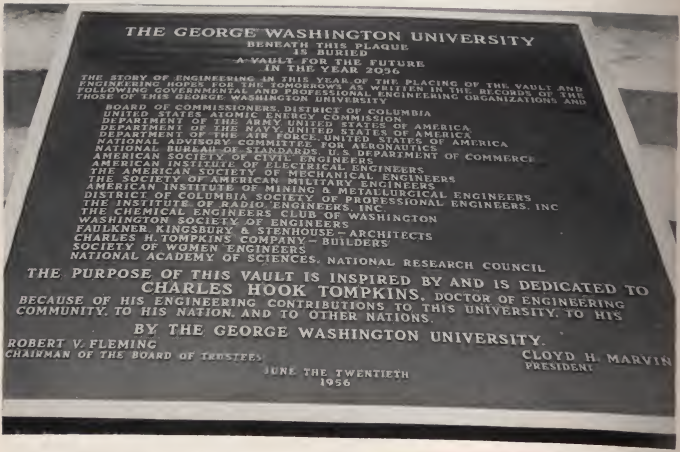
Electrical panel boxes are installed in every laboratory where special electric power may be required. Their panels provide jacks for the various circuits, as well as ground terminals, so that power connections may be made immediately to any working station in the laboratory. Power supplies generally available are 115-volt direct current, 120-volt single-phase, and 208-volt three-phase alternating current. Electrical laboratories have available, in addition, 220-volt direct current.

Physical moving of machines or other heavy items of equipment will be accomplished by use of a hydraulic floor crane of two tons capacity. Its dimensions allow it to pass through the doorway of every major laboratory and to enter the freight elevator. In the materials testing laboratory, where heavy or bulky specimens may occasionally be tested,two overhead monorail hoists are placed so as to service both large testing machines and the force slab.

Flexibility and convenience of use were studied for each laboratory, as plans were developed. In addition to the services already described, the heat and power laboratory has exhaust steam and fume manifolds extending the full length of the room, with branches provided for future connections. Steam supply lines run only to the machines using steam at present, but tees are provided for fixture extensions. In the electric power and communications laboratories, switch stands, meter panels,

(Please turn to page 26)

Charles H. Tompkins



EDITORIAL

Oh, it was pitiful!
Near a whole city full
Home she had none.

—Thomas Hood, *The Bridge of Sighs*

These lines could have applied to the School of Engineering because prior to this year "she" had no real home in the University "city". No home, that is, unless you count the hodge-podge facilities distributed throughout antiquated Building N, inadequate Corcoran Annex, and dilapidated Draper Hall to which a wrecking crew is now administering the coup de grace. *These facilities are no longer required and the poetry no longer applies because Tompkins Hall of Engineering proudly graces the western edge of the campus and the School of Engineering has a home.*

The building is a gift from Charles Hook Tompkins, Trustee of the University and prominent engineer of the District of Columbia. As President of the Charles H. Tompkins Company since 1922, Mr. Tompkins has directed construction of many buildings in this area and elsewhere. Among the latter are defense projects such as Bainbridge Naval Training Station and the White Oaks Ordnance Laboratory. In Washington, his firm erected Garfinckel's Department Store, the National Guard Armory, the Tower Building, and the District of Columbia Federal Court House to name only a few. Since 1935 all buildings at The George Washington University have been built under his supervision. These include Lisner Auditorium, the University Hospital and Cancer Clinic, the University Library, Hall of Government, Strong Hall, and Monroe Hall.

Mr. Tompkins is active in a host of engineering and civic organizations and is probably known to practically everyone associated with the field of engineering in this area. The following lines may reveal something of his nature. They are the closing paragraph of Mr. Tompkins' remarks on the occasion of the dedication of the Vault for the Future in his honor on June 20, 1956.

> "It has been my privilege for a number of years to serve as a Trustee of this University, and it has been a very satisfying experience. The University is honoring me today in appreciation of what they say I have done for the University. I, in turn, on behalf of people everywhere, express to The George Washington University our sincere thanks for its wonderful accomplishments, and its dedicated service to the young people of the world."

And to you, Mr. Tompkins, on behalf of the present and future students of the School of Engineering, our sincere thanks for Tompkins Hall of Engineering.

R. J. S.

COMFORT CONDITIONING OF TOMPKINS HALL

By Dave Lewis B. M. E. '57

Back in the "good old days" of the one room school houses, the size of the potbellied stove and the height of the wood pile were the only measures of anticipated winter comfort. Even under the most favorable conditions, the term comfort was pretty relative when associated with an iron stove, for one of the features inherent with these wood and coal consuming monsters was their ability to severely toast the foremost and leave the hindmost out in the cold — so to speak. The effective heating radius of the iron stove was often so limited that an effective reward for the studious pupils was to assign them a ring side seat.

The designers of the heating, ventilating and air conditioning system which has been installed in Tompkins Hall have left the concepts of comfort coincident with the era of the potbellied stove way back in the horse and buggy age where they belong. They have installed such a year 'round system that, by virtue of its completeness, it might be described as simply "comfort conditioning."

Author at Work in M. E. Lab

Because this comfort system was designed especially for the requirements and specifications of Tompkins Hall, and all the components have been placed integrally within the structure, it is most conspicuous by the absence of plumbing and ductwork. The only parts of the system which are really physically apparent to the casual observer are the convectors nestled under each window.

The average person seems to feel more benevolent toward these Marlo convectors than he would to that old necessary evil, the radiator. These units do away with whistling steam cocks, hammering pipes, and hip thumping corners. Not only that, they have that look of functional efficiency which pleases the most aesthetic nature.

One has only to raise the panel at the top of each of these fixtures to realize from the profusion of controls both visible and implied, that its purpose is not adornment. These units are analogous to the nervous system of the human body. As a nerve terminus would relay the message from each body cell to the control center, each of these convector units relays the needs of its particular room to the main temperature source. The convector units do more than just control the temperature however, for they are also charged with regulating the humidity, circulating air, filtering air, and mixing fresh air from outside of the building with recirculated air from inside the room.

To best understand the system as a whole, we shall analyze it separately for each of its operations, that is heating, cooling, and ventilation. Consider one pound of water in the heating system in the dead of winter. Obviously this pound of water must be heated above the ambient temperature if it is to be capable of losing heat to the convectors. The heating of the water takes place in a heat exchanging device where steam from a low pressure boiler is condensed. In the process of cooling the boiler steam, ,the temperature of the one pound of water is greatly increased. From this point, the water is pumped into one of the zone pipes. Since different portions of the building require different amounts of heat due to such factors as sun and wind exposure and the wall construction in a particular area, the building is divided into zones of equal requirement. This zoning

arrangement allows the most efficient distribution and helps to maintain all portions of the building at the same condition regardless of any external factors which would otherwise affect the system. In Tompkins Hall there is an East and West zone. From the zone pipes, the pound of water is pumped through one of the convectors. The flow rate through the convectors is governed by the amount of heat which must be dissipated in the particular area. If the requirements are large, the pound of water will flow through the coils of the convector at a higher velocity.

As the heated water moves through the coils of the convector, air is moved across the outer surfaces of the coils. This air movement is provided partly by natural convection, and partly by the forced convection of the unit fans. Part of the air which circulates across the heating coils is fresh air from outside of the building, and the remainder is air re-circulated from inside of the room. The fresh air requires much more heat before it approaches the design temperature of 70° F. Once the specified temperature has been reached in any room, the only heat which must be added to the recirculated air is that which is lost from the room through such sources as radiation, and conduction through the walls.

The temperature of the air exiting from the convectors may be varied in several ways. These methods are, slowing down the flow of air across the coils, limiting the amount of fresh air introduced into the system, or limiting the amount of water flowing through the coils. All of these may be controlled manually at the panel in each unit. The architects' specifications also call for a room wall thermostat to be installed in every classroom to control the temperature automatically.

The pound of water which we chose to follow through the heating system has lost heat to the room and, in heating the coils and the room air, its temperature has dropped. The pound of water as it exits from the coils then, is only lukewarm and is returned to the heating tank where it will once more be brought up to the operating temperature by the steam from the low pressure boiler. At this point it is re-circulated throughout the system.

During the summer, when everyone begins to wish for the cold weather we had in February, our pound of water will undergo a somewhat different treatment. Now instead of being heated, heat is taken from the water. To accomplish this, the water is circulated through the chiller of a refrigeration system. The refrigeration system which is installed in Tompkins has such a large capacity that its two York compressors are each operated by a 100 hp electric motor. These two compressors operate in parallel to handle the cooling requirements of Tompkins Hall.

As the pound of water leaves the refrigeration evaporator, it is called, in the parlance of the air conditioning engineer, "chilled." This is an understatement since the temperature of water leaving the evaporator will be about 40° F. The pound of chilled water flows through the system in the same manner it did when it was heated. The only important change is that inside the convector

Part of the Air-conditioning Equipment

coils, the water takes heat from the air. The heat taken from the air flowing through the convector will be enough to raise the temperature of the water 10° F. on a warm day.

An additional service done by the convector in the process of cooling the air is to control the humidity. The higher the temperature of air, the greater is its capacity for retaining water vapor. When the air is suddenly chilled, as will happen in the convector, some of the water vapor must condense. This condensate collects on the convector coils and eventually flows into a special drainage system. This humidity control will undoubtedly be highly regarded by any one who is the least bit familiar with Washington's muggy summers.

How effective this air cooling system will be in this installation remains to be tested of course. On the drawing board, however, the system promises some real "cool" comfort . . . to quote from the nomenclature of the Rock 'n Roll set. When the outside dry bulb temperature is 95° F. and the wet bulb temperature is 78° F. the system is supposed to maintain inside conditions of 80° F. and a relative humidity of 50%.

When one considers the amount of heat which will flow into the building from the outside, the amount of heat radiated through windows and openings, and the heat given off by the bodies of all the diligent students, it is quickly recognized that the job of the refrigeration system is indeed a prodigious one. All of this heat collected by the chilled water from every room in the building must be dissipated in one place — the condenser of the refrigeration system. Unlike the small home refrigeration systems found in deep freezes, room air conditioners, and the icebox, the heat from the condenser can not be dissipated by air circulation. If such methods were employed for a system of a capacity as large as Tompkins Hall has, the air temperature would soon become intolerable. Also, as the air temperature reached higher and higher levels, the efficiency of the refrigeration system would decrease. For this reason, the condenser of the refrigeration system in Tompkins uses water circulation for a coolant. An obvious problem in economics is presented when one considers the tremendous volumes of water which would be wasted if it were to be discharged into the sewer when its temperature had increased to the point where it would no longer

(Please turn to page 28)

A C.E.'S. VIEW of TOMPKINS HALL

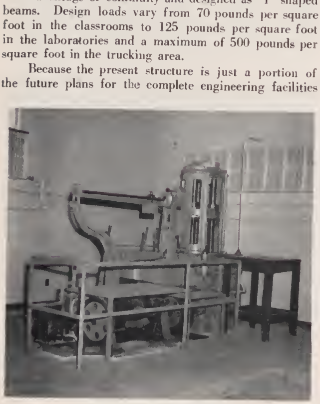
By Dick Rumke B. C. E. '57

Structurally, Tompkins Hall of Engineering is not unique. Functionally, it is the acme of engineering educational facilities.

Tompkins Hall, occupying an area of approximately 9100 square feet not including the boiler room addition, is a four story structure with a lower level mezanine and basement. It contains two audio-visual rooms, nine class rooms, four drafting rooms, fourteen laboratories, sixteen offices, one machine shop room and one photographic dark room.

The building is a reinforced concrete frame with the concrete beams and girders designed for continuity based upon the Building Code of the District of Columbia. Class rooms and laboratories have ribbed floors which incorporate the value of concrete slabs in compression, built monolithically with closely spaced beams to obtain full advantage of continuity and designed as "T" shaped beams. Design loads vary from 70 pounds per square foot in the classrooms to 125 pounds per square foot in the laboratories and a maximum of 500 pounds per square foot in the trucking area.

Because the present structure is just a portion of the future plans for the complete engineering facilities to be provided by The George Washington University, provision has been made in the footing design for this future expansion. The footings vary with regard to the load and range in depth from 15 inches to 54 inches. Although not uncommon in building designs of today, it is interesting to note that there is at least one of each type footing. A pile footing was not required because the allowable soil bearing pressure is 6,000 pounds per square foot.



Rhiele Testing Machine

The columns vary in size from the minimum code requirement of 12 inches by 12 inches to a 28 inch column. Although all the columns appear square, many have been spirally reinforced to conserve on space limitations by using the extra resistance to load of the spiral column.

The longest clear span is 28 feet 4 inches for interior beams with a cross section of 16 inches by 36 inches. The "T" beams are nominally fourteen and one-half inches in depth and, due to the long span lengths, have been braced midway with bridging members or cross ribs.

High bond reinforcing bars were used throughout the construction except for the wire mesh in the slabs. This type of bar removed the necessity of providing hooks on the ends except in those cases, such as the strap footing, where the length of embedment of the bar was too short to fully develop the full strength of the bar in bond.

In order to conform to the other new buildings on the campus, a limestone facing has been applied to the exterior together with a brown granite facade, aluminum window frames and aluminum spandrel beams below the window frames.

The lobby has dark green marble walls, a tan marble floor and an acoustically treated ceiling. The class room ceilings consist of the exposed ribs from the floor above whereas all hallways have dropped ceilings with a smooth plaster finish.

Walls are nominally fifteen inches thick and are composed of the limestone facing, masonry back up and an interior cinder block facing which has a green painted four inch cross wall. An eight inch fire wall surrounds all stair wells.

With the exception of the audio-visual rooms, the class rooms have been designed to accommodate approximately 35 students and the laboratories 20 students.

Functionally, every laboratory has been equipped with electric power, both AC and DC, single and three-phase, together with gas, compressed air and water facilities. The walls have been lined with work tables, sinks and cabinets. Stub ends are available in all the rooms for future expansion and flexibility.

The Materials Laboratory has a special force slab constructed of reinforced concrete which has been poured on the ground and isolated from the surrounding ground floor slab by means of a one inch expansion joint. The force slab is 26 feet by ten feet by three feet thick and is equipped with inserts for jack attachments to test slabs and beams.

A new testing machine capable of applying 400,000 pounds pressure is being installed to test full-size structural joints. The 200,000 pound Rhiele testing machine has been transferred to the new Materials Laboratory from Corcoran Hall and an erector set testing machine that will apply loads in three dimensions at the same time is being provided.

Apparatus is also being provided in the Materials Laboratory that will permit the study of actual field conditions by inserting tapes removed from strain gages on installations in the field into a machine and thus apply the same loads to the test specimen.

The Fluid Mechanics Laboratory will have a flume 16 feet long by six inches wide to study spillway and dam flow. A small, low speed, wind tunnel has been purchased to provide experiments in aerodynamics. Wave patterns will be observed by placing two-dimensional models on a potential flow table, obtained from the Naval Research Laboratory, and flowing a thin sheet of water over the sloping surface. Stream flow will be observed through a two-dimensional plexiglass smoke tunnel. The smoke from a kerosene burner will be drawn through small openings and around a model inserted in the tunnel in thin streams. Flow patterns will also be observed in a plexiglass model test set up by means of a collodial solution and polarized light.

The Concrete Laboratory will be equipped to prepare test specimens under controlled curing conditions because of the moist room that contains spray nozzles to maintain 100 percent humidity. A separate air conditioning unit, divorced from the main building system, has been incorporated to maintain actual field conditions. Aggregate bins on legs and casters will conserve time and provide ease of operation in securing the proper amount of aggregate.

The Stress Analysis Laboratory will be equipped to do photo elastic work on stressed models. Remote control for loading models by means of water valves will increase testing efficiency. One corner of the Lab has been curtained off for use as a dark room for the polariscope. Special saws, a drill press and a lathe will be available to do model cutting.

The Soil Mechanics Laboratory is equipped with a direct shear machine, a triaxial shearing machine, consolidometers and sampling equipment. With this equipment, it will be possible to perform tests on soil specimens to determine identification, soil stability, and moisture content to obtain maximum density in a fill.

A bridge between and over the Mechanical Laboratory and Materials Testing Laboratory provides the necessary space to perform computations and preparation of reports by students and affords a view looking down upon the test set up.

The general philosophy in arranging the laboratories is toward studying principles and using experiments that demonstrate those principles by using small equipment to obtain maximum utility of space.

Architect for the building was Faulkner, Kingsbury and Stenhouse of Washington, D. C. James M. Gongwer, Consulting Engineer, Washington, D. C., was the structural engineer. Chas. F. Tompkins Company was the builder.

Wind Tunnel

Flume in Fluid Mechanics Lab

The Electrical Engineering Facilities of Tompkins Hall

By Bob Keith B. E. E. '58

To expand the old saying "Clothes don't make the man" — buildings don't make the Engineering School. There is no denying, however, that a person feels better somehow when all dressed up in a new suit. An air of exhileration, expectancy, and even confidence, accompanies a change. Perhaps this is the best way to describe the present atmosphere of the Electrical Engineering Department. The new suit, in this instance, is the modern structure that is the new home of The George Washington University School of Engineering—Tompkins Hall.

Theoretical knowledge without practical experience is of little value. It is only in the laboratories that students can obtain some measure of practical experience. Labs, therefore, are extremely important to the student engineer and form a vital part of the engineering curriculum. The laboratories in Tompkins Hall are indeed a credit to the builder and to the University. When finally completed they will contain not only the most modern equipment and furnishings, but will also be air conditioned and well lighted for the convenience of the occupants.

The Communication and Power labs, which will occupy the majority of the hours that the undergraduate EE spends in lab courses, are located on the first floor and face the rear of the building. These labs, together with the instrument and storage room which separates them, take up almost the entire 140' length of the structure, and have facilities for thirty-two students. It was originally anticipated that these rooms would be completed for operation by the first of September. The equipment was moved in and mounted prior to the scheduled opening; however, it has been necessary to place the accumulated supplies (which will later be housed in the yet incomplete storage room) in these adjoining labs. The final task of wiring has to be postponed until the miscellaneous equipment can be removed.

One of the more modern innovations in this section of the new structure, and one that is primarily a safety factor, is the protective wall which extends the width of the Power lab and which separates the student from the transformers. The bottom part of this semi-wall is a thick, solid partition. From the top of the partition to the ceiling there is a heavy wire mesh screen.

It is expected that these two laboratories will be ready for use in the very near future. One thing that might seem incongruous is the fact that equipment, previously used in the old buildings, has been retained for use in these model workshops. All of this equipment is still in good condition and perfectly adequate for the use intended: to teach the basic fundamentals and prin-

At the present time there are no formal lab courses being offered by the University that will utilize the facilities of the three remaining EE labs in Tompkins Hall. These labs, Microwave, Measurements, and Antenna, will be available to undergraduate and graduate students alike for individual experimentation and special projects.

The Microwave Laboratory (Room 208) is still to be finished; however, when completed, it will contain all wooden furniture in order to minimize absorption.

The Measurements Laboratory (Room 207) will contain precision equipment, and the most modern facilities available for making precise electrical measurements of all types. It will be arranged to accommodate approximately sixteen students.

The Antenna Laboratory, on the fourth floor, should be ready for use in the near future. The equipment, which will be used to do work pertaining to antennas and radiation, is still not installed. At present, this room's only sign indicative of things to come is the hole in the roof which will soon be filled by an antenna.

In addition to individual experimentation, the above three labs (Microwave, Measurements and Antenna) will also be utilized for research and development of new ideas in these fields.

Communications Lab

Mathematics and the Engineering Student

By Sy Mathews B. S. E. '57

As chairman of the Tutoring Committee of Sigma Tau, I have had many opportunities to meet students who ask for scholastic assistance outside of the classroom in order to learn the many physical concepts pertaining to the engineering field. The students who seek aid are not only those who feel that they will fail courses unless they receive help, but also those who are in the upper one-half of their classes and have no fear of failing any course. Both groups have one thing in common — an inadequate understanding of the theory and application of mathematics.

Mathematics is one of the most useful tools at the disposal of an engineering student. It allows him to solve problems and develop theories by means of a shorthand notation. Without this powerful tool, students would be obliged to flounder in a labyrinth of words in order to analyze and solve even the simplest problem. Many students cry that mathematics is too hard to learn and apply; but, if they were asked to solve problems without the use of mathematics, they would surely drown in their tears.

Why do students have such great difficulty with mathematics? This question has plagued students and professors alike. It is not an easy question to answer.

The potential engineering freshman usually studies algebra, geometry and trigonometry in high school. During the three or four years in which he studies these subjects, he finds little practical use for his knowledge. During his study of analytic geometry and differential calculus in college, a question begins to grow in his mind. "How much of the mathematics, which I'm studying, will be of use to me in engineering?" Too often this question is not answered until the student is in his junior or senior year. Recalling that his knowledge of mathematics was of little use in his high school days, he is inclined to let small bits of information slip through his fingers. As time goes by, his knowledge of mathematics may grow at an ever decreasing rate.

Most students find that integral calculus and differential equations are the most difficult math courses to comprehend. They realize that they neglected to learn such things as the definitions of a derivative and a differential, methods of differentiation, L'Hospital's Rule and Cramer's Rule. Many find that logarithms, trigonometric functions and exponential functions are great stumbling blocks. All of these difficulties could have been avoided if they had studied their previous courses with vigor and determination. Without a firm mathematical foundation, many students struggle through the more advanced courses in mathematics and, upon their completion, may feel that the worst part of the engineering curriculum is past. Actually, the difficulties are just beginning.

During their junior and senior years, students are exposed to mathematical concepts to which they were not previously exposed. They study the Laplace Transform, Fourier Series, Fourier Integral, Bessel Functions, and Vector analysis. To understand these concepts easily, students must have a thorough comprehension of fundamental mathematics. Many students in their senior year of engineering have failed a course in their particular field of study and have not been allowed to graduate. In many cases the reason is obvious. The failing students had an inadequate understanding of the theory an application of mathematics.

Mathematics is not an easy subject to stud comprehend. The members of Sigma Tau real students may have great difficulty in underst just as they may have difficulty in underst other subject. The Tutoring Committee o is available to any engineering student v in comprehending concepts pertaining t curriculum.

WHAT'S DOING at Pratt & Whitney Aircraft . . .

Pratt & Whitney Aircraft engineer checks a bread board model for a subminiature, encapsulated amplifier built with transistors.

A rig in one of the experimental test cells at P & W A 's Willgoos Laboratory. The six large finger-like devices are remotely controlled probe positioners used to obtain basic air flow measurements within a turbine. This is one of the techniques for obtaining scientific data vitally important to the design and development of the world's most powerful aircraft engines.

. . . in the field of INSTRUMENTATION

Among the many engineering problems relative to designing and developing today's tremendously powerful aircraft engines is the matter of accumulating data — much of it obtained from within the engines themselves — and recording it precisely. Such is the continuing assignment of those at Pratt & Whitney Aircraft who are working in the highly complex field of instrumentation.

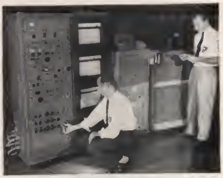
Pressure, temperature, air and fuel flow, vibration — these factors must be accurately measured at many significant points. In some cases, the measuring device employed must be associated with special data-recording equipment capable of converting readings to digital values which can, in turn, be stored on punch cards or magnetic tape for data processing.

Responsible for assembling this wealth of information so vital to the entire engineering team at Pratt & Whitney Aircraft is a special group of electronic, mechanical and aeronautical engineers and physicists. Projects embrace the entire field of instrumentation. Often involved is the need for providing unique measuring devices, transducers, recorders or data-handling equipment. Hot-wire anemometry plays an important role in the drama of instrumentation, as do various types of sonic orifice probes, high temperature strain gages, transistor amplifiers, and miniaturized tape recording equipment.

Instrumentation, of course, is only one part of a broadly diversified engineering program at Pratt & Whitney Aircraft. That program — with other far-reaching activities in the fields of combustion, materials problems, mechanical design and aerodynamics — spells out a gratifying future for many of today's engineering students.

Instrumentation engineer at Pratt & Whitney Aircraft is shown investigating modes of vibration in a blade of a single stage of a jet engine compressor.

Special-purpose probes designed and developed by P & W A engineers for sensing temperature, pressure and air flow direction at critical internal locations.



The "Plottomat", designed by P & W A instrumentation engineers, records pressure, temperature and air flow direction. It is typical of an expanding program in automatic data recording and handling.

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OUT OF THE BRIEFCASE

NEW INERTIA DYNAMOMETER

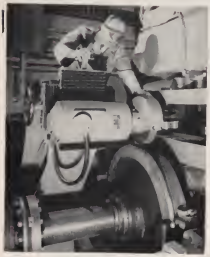
The world's largest inertia dynamometer for testing full-scale rail wheels was recently established at U. S. Steel's Applied Research Lab. Standard railroad wheels from 30 to 48 inches in diameter can be tested under normal or exaggerated conditions simulating factors of loading, braking and tracking encountered in actual service.

The dynamometer comprises a mill-type electric motor, a variable-weight fly wheel, a track wheel, a spring loading device, a braking mechanism, ultra-modern instrumentation and both automatic and manual controls integrated into a two-story installation weighing over 225 tons. The bulk of the installation is underground.

The direct-current motor has a power output of up to 450 horsepower and can be controlled at speeds up to 1500 revolutions per minute. Deceleration as well as acceleration rates can be closely controlled.

Direct current is supplied to the dynamometer by a 250-kw motor-generator with a 200 per cent overload rating. Auxiliary units supply forced lubrication, hydraulic pressure and pneumatic pressure.

The variable-weight flywheel comprises 14 removable discs fitted on a tapered shaft and bolted together. With all discs in place, the motor accelerates the dynamometer to top speed in less than six minutes. At top speed, a maximum energy of 68.5 million foot-pounds can be imparted to the test wheel. This is enough energy to throw a 16-pound bowling ball from New York to Chicago. With such high energy levels available, tests at twice the level encountered in actual service can be conducted.



Inertia Dynamometer

UNIVAC SCIENTIFIC 1103A

A new electronic computer, the Univac Scientific 1103A, will soon be put into operation by the Lockheed Missile Systems Division. The 1103A, built by Remington Rand, will analyze secret missile data obtained during flights of vehicles from two projects. The new computer is of the digital type which computes units rather than comparing measurements as is done by the analog type.

To handle computations at a rapid rate, the computer features two high speed memories — a magnetic core unit and a magnetic drum unit. Each of the memories has different storage and speed capabilities. The magnetic core, from which information can be plucked in eight millionths of a second, has rapid-access storage for 4096 words. The magnetic drum has a memory capacity of 16,384 words and produces information in 17 thousandths of a second. Each word consists of 36 binary digits and is equal to a 10-digit number. The computer can add nearly 30,000 of these numbers in one second.

Magnetic tapes are often used as individual memories with each tape holding 383,000 words which can be used for either input or output functions.

The complete computer consists of some 15 related units and will occupy about 2000 square feet of floor space. Forty-one different arithmetic and logical operations can be performed. Instructions and initial data are fed in four different ways — on magnetic tape, punched cards, punched paper tape, or manually. Final results are produced on magnetic tape, on punched cards, or by electric typewriters.

NEW TR TUBE AND MAGNETRON

A new TR tube and a tunable magnetron, both for application in radar systems, were announced recently by the Sylvania Electric Company.

TR tubes serve as electronic switches permitting the equipment to alternately send and receive signals with one antenna. The miniature TR tube, 50% smaller than comparable components, was developed for commercial radar as a tube combining small size, ease of installation and removal, and low cost. The new tube is broad-band — operating in the 8500 - 9600 megacycle frequency range. Design and method of mounting make the new tube a rugged component in equipment where high shock and vibration conditions exist.

The tunable magnetron was developed to replace fixed-frequency magnetrons now in use. A magnetron is an essential power-producing component in radar sets. The new magnetron can be tuned in a range of 600 megacycles in any portion of the 8500 - 9600 megacycle frequency band. It has a minimum power output of 210 kilowatts.

RCA–First to bring your home the stereophonic sound you've heard at movies

Now in your own home you can hear music in *perspective*, just as in the concert hall. Strings from the left. Brass from the right. The secret lies in amazing new RCA Victor Stereophonic Tape, pre-recorded with 2 sound tracks. The RCA High Fidelity Stereotape Player reproduces sound through two separated groups of speakers . . . gives recorded music new dimensions.

RCA, originator of many other "firsts" in sound, continues to pioneer in "Electronics for Living" at its David Sarnoff Research Center in Princeton, New Jersey—"trains" the electron to make life fuller, easier, happier.

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RCA offers careers in research, development, design, and manufacturing for engineers with Bachelor or advanced degrees in E.E., M.E. or Physics. For full information, write to: Mr. Robert Haklisch, Manager, College Relations, Radio Corporation of America, Camden 2, New Jersey.

"VICTROLA" Stereotape Player. Two units—tape transport, amplifiers and 3 speakers in one; 3 speakers in other. 8STP2. Both, complete, **$350.00.** Available also in matched luggage-styled cabinets at **$295.00.**

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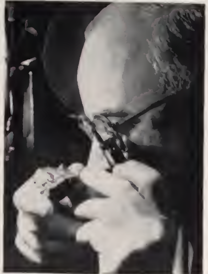
ELECTRONICS FOR LIVING

WELDING GRAPHITE

At the opening of its new research laboratories in Parma, Ohio, Union Carbide and Carbon Corporation announced it had discovered how to "weld" pieces of graphite together.

Dr. Robert G. Breckenridge, director of the laboratories, suggests that prefabricating sheets and panels for the assembly of nuclear reactor moderators might now be possible. These sheets and panels are presently built up from graphite blocks. Graphite is essential in nuclear reactors because of its neutron-slowing abilities which make possible the self-sustaining chain reaction necessary in harnessing nuclear energy.

Pieces of graphite to be joined together are placed in an atmosphere of argon gas under high pressure. The pieces are brought into contact and a direct current is passed through them. The pieces are then separated slightly, creating an arc that heats the graphite to extremely high temperatures. This combination of heat and pressure melts the graphite and the pieces are welded together. The high pressure is necessary because heating graphite at atmospheric pressure causes it to sublime.



Examining a piece of welded graphite (weld line is between dull and shiny regions).

A similar technique is used for a sort of continuous casting process, in which comparatively large pieces of graphite are formed from the liquid state. This graphite has a degree of crystalline perfection comparable with that of the best natural graphite, formed millions of years ago in nature.

ROUGHING MILL

Completely automatic card-programmed roughing mills are the newest addition to the automation field. Westinghouse Electric Company recently developed such a mill for the Jones and Laughlin Steel Company. The control system will permit an operator to initiate a detailed rolling schedule simply by pressing a push button. By selecting the proper card from several pre-punched for each schedule, it will be possible to attain a definite set of reductions while allowing for variations in temperature and composition among individual slabs.

Main drive and auxiliary electrical equipment include two 3000-hp motors for the main horizontal rolls, a 375-hp mill motor for the attached edger, two 75-hp mill motors for horizontal mill screw down and two 50-hp mill motors for adjustment of edger rolls.

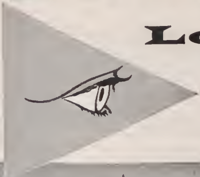
The IBM cards which will be used can be prepared for practically every slab and strip size and grade of steel so that proper drafts and speeds will produce a product of high uniformity at a high production rate. Each card will include all the requirements of a given schedule: mill screw-down opening, edger adjustment, opening mill speed and edger speed. Also included will be a note to indicate when the last pass has been completed.

As the cards are put in the card reader the first schedule is read and transferred to a transistorized memory element.

As a slab approaches the mill, control equipment acts through magnetic amplifier output units to preset roll openings and speeds. After each pass, reversing is brought about by sensing devices that read the position of the slab and reverse the rolls after a brief period of slow-down. When the final pass is completed, an indicator light signals the operator that the strip is ready for the finishing mill. The mill is then preset for the next schedule by pressing a schedule advance button.

When completed, the new roughing mill will feed a six-stand continuous hot strip mill. Main horizontal rolls of the roughing mill are 42 inches in diameter and 44 inches wide. Each edger roll is 24 inches in diameter.

Engineers... Look ten years ahead!



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CAMPUS NEWS

AIEE-IRE

AIEE-IRE is pleased to announce that their membership now stands in excess of eighty members, a record membership for the branch.

Member participation also seems to be somewhat of a record this semester, as evidenced by the large number who turned out for the excellent talk on High-Fidelity by Mr. William Shrader, at the November meeting.

The program for the December 5th meeting will give the branch a chance to deviate from purely technical considerations and take a more comprehensive look at the field of engineering. The program will consist of a symposium on "The Student and Engineering Manpower." Participating will be:

Dr. Henry E. Armsby, Chief Engineering Education, U. S. Office of Education;

Mr. James E. Bridges, Assistant Secretary of Defense, Applications Engineering;

Dr. R. E. Lapp, Chief of Fellowship office, National Academy of Sciences.

At the end of the program, members will be given a take-home quiz to determine the recipient of the IRE student prize.

ASCE

Commander W. R. Anderson's talk on "The Atomic Sub" has shown that the building of such a machine is ninety percent engineering and ten percent physics. An interesting fact for any engineer to know and especially for those who attended the meeting and heard the talk.

Mr. A. J. Zauher, Product Manager of the U. S. Steel Corporation and member of Sigma Tau, spoke on the application, design, fabrication and erection of steel bar joists at the November meeting. Mr Zauher culminated his talk by presenting "Steel Joist Design Catalogues" to the attending members.

At a special election, Dick Pronk was elected ASCE Representative to Engineers' Council. Art Koski and Joe Scott won the door prize of a drop bow pen and a luncheon ticket respectively.

ASCE President Dick Rumke and Commander W. R. Anderson.

HAM CLUB

A ham radio club is being formed on campus. Interested students may obtain forms at the Student Activities Office in the Student Union Annex. Additional information may be obtained from Bob Shuken whose phone number is RA 3-9419.

ENGINEERS' MIXER

The annual Fall Engineers' Mixer was held on October 12 and those who attended enjoyed a fine buffet lunch and a skit put on by some of the students of the School of Engineering. Even the speakers for the evening had something interesting to say as can be proven by the obvious interest of the engineers in the picture below. The mixer was fairly well attended by the older students of the school but there were disappointingly few freshmen there.

Engineers at Fall Mixer

ALUMVIEWS

PRESIDENT'S MESSAGE

By FRANK T. MITCHELL, JR.

President, Engineers' Alumni Association

As was reported to members of the Engineer Alumni Association in our dues billing notices of this month, activities among alumni of the School of Engineering are already at a busy pace. Highlighting these activities, of course, is the presence of the school in its new quarters, Tompkins Hall of Engineering.

As magnificent as this building is, it still offers many challenges for those devoted to the continued development of our Alma Mater. Specifically, considerable new equipment is needed to create in this fine building, an equally up to date plant.

The Engineer Alumni Association, therefore, is considering as one of its primary responsibilities the exertion of leadership in behalf of the Tompkins Hall Equipment Fund. We call upon all of those interested in this project to join with us as our plans progress.

There will be several avenues of approach: through support of the 1957 Annual Alumni Fund, beginning in January; through the contact of business firms in the Washington Metropolitan Area; and through the contact of national foundations and corporations.

You can first assist this program by enlisting as a paid member of the Engineer Alumni Association ($1.00 per year). Furthermore, you can then join the team of alumni workers who carry out this campaign in behalf of the School of Engineering. Please call me or write for any further information.

SAMUEL MAWHOOD (BEE '56, Sigma Tau V. P., Omicron Delta Kappa, Engineers' Council President, to name only a few) is with Field Engineering at Hughes Aircraft Co. Sam is attending fire-control system school but after finishing school his destination is unknown.

CASEY MOHL (BME '55) is working at the Jet Propulsion Laboratories at Pasadena.

ELIAS WEINBERGER who graduated with a B.E.E. in 1950 reports that he is now a Research and Development planner for the Communications Branch of the Bureau of Ships, Navy Department.

ALUMNI NOTES

By the Alumni

RESERVED

FOR

ALUMNI

WHO

FILL

OUT

THE

COUPON

BELOW

TO: ALUMNI EDITOR

Mecheleciv Magazine
The Davis-Hodgkins House
The George Washington University
Washington 6, D. C.

From: ______________________________

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Here are a few comments for ALUMVIEWS on where I'm working, what I'm doing and news of my family.

____

____

____

____

Degree and Date ______________________ Fraternity ______________________

Two cannibals were in an asylum. One was tearing pictures of men, women and children out of a magazine and eating them.

"Tell me," said the other, "is that dehydrated stuff any good?"

In the Fourteenth Century there was a king who liked very much to hunt wild game. This selfish ruler wanted all the wild game for himself, so he issued a proclamation that made hunting a crime, punishable by death. The poor starving peasants soon got tired of this setup so they kicked the king out of office. And so, this became the first instance on record where the reign was called on account of game.

ON THE SUB-ZERO BEAT FREQUENCY

By JAMES S. SHREVE B. S. '57

"Although the idea of minus frequencies appears at first glance absurd, one must remember that all concepts appear logical or absurd, depending only upon our familiarity or unfamiliarity with the phenomena described." Thus spoke Dr. H. H. Leer concerning his paper "The Sub-Zero Beat-Frequency", recently presented at the George Washington University's Applied Heterodynamics Symposium.

In order to understand Dr. Leer's work, let us first consider the following:

If a sinusoidal electrical signal of frequency A is multiplied electrically by a similar signal of lower frequency B, the resulting signal will have a component of frequency A-B. This operation is called "heterodyning", and takes place in all modern radio receivers.

Dr. Leer discovered, and a consideration of symmetry suggests, that in such a process an additional frequency B-A is also generated. This minus frequency was actually detected by Dr. Leer with a special detector circuit.* He named the frequency the "sub-zero beat-frequency".

Mathematical proof of the existence of the sub-zero beat-frequency is straightforward. A simplified version is given below.

Consider the following identities:

$$\tfrac{1}{2}(\cos 2\pi At \cos 2\pi Bt - \sin 2\pi At \sin 2\pi Bt) = \tfrac{1}{2}\cos(2\pi at + 2\pi Bt)$$

$$\tfrac{1}{4}(\cos 2\pi At \cos 2\pi Bt + \sin 2\pi At \sin 2\pi Bt) = \tfrac{1}{4}\cos(2\pi At - 2\pi Bt)$$

$$\tfrac{1}{4}(\cos 2\pi At \cos 2\pi Bt + \sin 2\pi At \sin 2\pi Bt) = \tfrac{1}{4}\cos(2\pi At - 2\pi Bt)$$

Addition of the above three equations gives

$$\cos 2\pi At \cos 2\pi Bt = \tfrac{1}{2}\cos(2\pi At + 2\pi Bt) + \tfrac{1}{4}\cos(2\pi At - 2\pi Bt) + \tfrac{1}{4}\cos(2\pi Bt - 2\pi At)$$

The left-hand side of the above equation represents the postulated multiplying operation; the right-hand side is the result. Indeed the frequency B-A is present—a minus frequency!

Thus a whole new spectrum of frequencies has been stumbled upon, for it is thought that for every plus frequency there is a corresponding minus frequency. This will certainly shed new light on the nature of that elusive particle, the anti-photon, discovered by Dr. Leer in 1951. (See *Scientific America*, p. 43, Fall Issue 1951.)

**Oddly enough, this circuit was first constructed quite accidentally by students in the University's Physics—132 laboratory.*

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At UCRL's Livermore, California, site—interior view of drift tubes in high-current linear accelerator designed to deliver 250 ma of 3.6 Mev protons or 7.8 Mev deuterons

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If you are a MECHANICAL or ELECTRONICS ENGINEER, you may be involved in a project in any one of many interesting fields, as a basic member of the task force assigned each research problem. Your major contribution will be to design and test the necessary equipment, which calls for skill at improvising and the requisite imaginativeness to solve a broad scope of consistently unfamiliar and novel problems.

If you are a CHEMIST or CHEMICAL ENGINEER, you will work on investigations in radiochemistry, physical and inorganic chemistry and analytical chemistry. The chemical engineer is particularly concerned with the problems of nuclear rocket propulsion, weapons and reactors.

If you are a PHYSICIST or MATHEMATICIAN you may be involved in such fields of theoretical and experimental physics as weapons design, nuclear rockets, nuclear emulsions, scientific photography (including work in the new field of shock hydrodynamics), reaction history, critical assembly, nuclear physics, high current linear accelerator research, and the controlled release of thermonuclear energy.

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(Continued from page 7)

or electronic power supplies are provided at closely spaced intervals, so as to be readily available to every working station.

In current plans, every effort is directed toward avoiding any unnecessary duplication of equipment. Of course, certain apparatus (ranging from monkey wrenches to oscilloscopes) is needed constantly to keep each laboratory operating. This will be provided in that laboratory, but many other items which have only occasional use can be "pooled" for the common use of all departments. In this way, it should be possible to acquire a greater variety of expensive apparatus than would be the case if seldom-used items were duplicated in different departments. By similar reasoning it will be seen that a single electronics workshop and a single machine shop can construct or maintain gear used by all departments. The money saved by thus streamlining operations can be used to obtain additional equipment.

Of all the difficulties encountered in setting up the new laboratories, the most troublesome came from the necessity to move equipment in and install it before the building construction was finished. The time available was just too short; as students and faculty know only too well, the building tradesmen were still working in the building months after the beginning of classes. This sometimes delayed the readying of equipment. The operations of moving and installation were coordinated, in order to reduce delays to a minimum. The old laboratories were dismantled early in the summer and everything was made ready to move. A few of the heaviest machines were installed even before the masons had completed all interior walls. Machines were moved as soon as the new building was secure, and smaller items of equipment as soon as the appropriate rooms were readied to receive them.

The installation and testing of the equipment followed a predetermined schedule, as far as this was possible in view of the sometimes conflicting requirements of the construction schedule. The laboratories that would be needed early in the Fall semester received first priority, while laboratories for Spring semester courses were scheduled for later completion. The heat power, materials testing, electrical power, and communications laboratories, as well as the drafting rooms are substantially completed and in use. Concrete, experimental stress analysis, and soil mechanics laboratories are well advanced and could be put in use now. Work will begin immediately in the fluid mechanics laboratory. The laboratories in heat transfer, instrumentation, ultra-high frequency, and calorimetry will be developed as soon as possible after that is ready for occupancy.

COMFORT CONDITIONING

(Continued from page 11)

be effective in the refrigeration condenser. The water lost in one warm day would be enough to fill a swimming pool of Rockefeller proportions.

The condenser water for the Tompkins Hall refrigeration system may be re-used again and again. The device which makes this possible is not unique to this installation, of course, for it is a part of the design for any large capacity air conditioning system. This device is a cooling tower. The particular structure in Tompkins Hall is constructed of redwood and mineral board baffles. The water from the refrigeration condenser is pumped from the basement to the cooling tower at the roof. Here air currents circulating throughout the tower by natural draft take heat from the condenser water as it spills from level to level in the tower. By employing this system, the condenser cooling water may be re-circulated again and again with only slight losses due to evaporation to be accounted for on the water bill.

One of the most significant parts of the Tompkins comfort system is the ventilating system. All the boilers and refrigeration systems can do is make the air hot or cold. It takes ventilation to dispel such bugaboos as the smoke filled room. Sitting in any of the class rooms, a ventilating system does not make itself physically apparent, for only several of the larger rooms have any visible intake ducts. A more thorough observer will note, however, that all of the doors to the hallway have a grille near the bottom. Fresh air enters the room through the convectors, where it is either heated or cooled, and then mixes with room air or air which is relatively stale. The fresh air which is circulated through the convectors totals about one-sixth to one-half of its 600 cfm capacity, depending on the design requirements for the room in question. Obviously if air is to be brought into the room, air must also leave it at about the same rate or the walls will eventually begin to bulge. This is where the grilled doors come in. Air is drawn through these door openings into the corridors, where it is drawn through exhaust ducts leading to the roof. On the roof, a squirrel cage blower powered by a 5 hp electric motor does all of the work. This blower is rated at over 11,000 cfm so it may be quickly seen that it doesn't take very long for it to completely refresh the air supply in Tompkins Hall.

The combination of these systems of heating, cooling, and ventilating comprises the Tompkins Hall comfort conditioning. If it meets the specifications established by the architects, which it shows every indication of doing, it should help to do away with some of the winter colds and summer "high temperature hookey." Then, for all of the future years in which engineering students fill its classrooms, Tompkins Hall will provide an engineered system of heating and air conditioning to keep them comfortable.

Doctor: "Is your cold any better?"
E.E.: "Naw."
Doctor: "Did you drink the orange juice after a hot bath?"
E.E.: "Naw, after drinking the hot bath I couldn't get the juice down."

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Slipstick Slapstick

A Dutchman returning from a hunting expedition was met by a friend, who, noting the flatness of his game bag said tauntingly, "Well, I see you've been hunting."

The luckless hunter nodded.

"Shoot anything?"

"I shot mein dog."

"Was he mad?"

"Vell, he vasn't so tam pleased."

Deciding to teach her drunken husband a lesson, his wife dressed up in a devil's costume. That night when he came staggering home, all lushed up, she met him at the front door. Through his bleary, bloodshot eyes, he looked her over and said: "Who in the heck are you?"

"I'm the devil, you sinner."

"Well, I'm sure glad to meet you. I married your sister."

A father and his young son, who carefully held in his lap a shoe box punctured with air holes, were seated in a bus. When the bus stopped for a red light, the lad was heard to ask, "Daddy, is my kitten a man kitten or a lady kitten?"

"A man kitten," said the father promptly.

"How do you know?" the boy continued.

Every passenger within earshot waited expectantly for the reply.

"Well," explained the father, "he's got whiskers, hasn't he?"

Fraternity Active: "Did you know that we maintain seven homes for the feeble minded?'

Pledge: "I thought you had more chapters than that."

A preacher recently announced that there are 726 sins.

He is being besieged with requests for the list, mostly from college students who think they're missing something.

"I shall now illustrate what I have on my mind," said the professor as he erased the board.

Did you hear about the ME who walked through the screen door and strained himself.

C.E.: "I suppose you dance?"

Coed: "Oh, yes, I love to."

C.E. "Great, that's better than dancing."

Coed 1: "I don't like that boy you're seeing."

Coed 2: "Why?"

Coed 1: "He whistles dirty songs."

A gangster rushed into a saloon shooting right and left, yelling, "All you dirty skunks get outta here."

The customers fled in a hail of bullets — all except an Englishman, who stood at the bar calmly finishing his drink.

"Well," snapped the gangster, waving his smoking gun.

"Well," remarked the Englishman, "there certainly were a lot of them weren't there?"

If they call professors profs, what do they call assistants?

Pable Piasco, an extremely modernistic painter, was robbed. In order to assist the police in catching the villain, he drew a sketch of the man. Guided entirely by this sketch, the police promptly rounded up two people, a TV aerial, three can openers, a hearse, and two pairs of boots.

Coed: "I want some alligator shoes."

Male Clerk: "Yes miss, what size does your alligator wear?

LETTERS TO THE EDITOR

Here is the revived Letters to the Editor department as promised.

Readers wishing to express an opinion or ask a question of general interest are invited to mail their letters to:

Editor
Mecheleciv Magazine
The George Washington University
Washington 6, D. C.

A pseudonym or initials may be used when the letter is printed but all letters must be accompanied by the writer's name and address. The Board of Editors reserves the right to edit lengthy letters.

EDITOR:

You can be very proud of the October *Mecheleciv!* I never thought I'd see a 40-page issue of such professional quality and content.

R. S. Babin

Ed.: *Thank you Mr. Babin. Letters like yours make the job a lot more gratifying.*

EDITOR:

Is there an Engineers' Alumni Club in Baltimore?

M. A. Jolson
3104 Labyrinth Road
Baltimore 8, Maryland

Ed.: *A check with Frank Mitchell, President of the Engineers' Alumni Association established that there is none as yet. Perhaps some of the alumni in Baltimore might see this and be interested in contacting you to form one. Don't get your hopes too high though. For some reason, probably closely associated with the proximity of Johns Hopkins, and the University of Maryland, we have a lot fewer alumni in Baltimore than one might expect.*

EDITOR:

The student of today must not only pursue his course of studies, but must also keep in touch with the "outside world." In this light I have prepared the enclosed article; I hope you will consider it for publication.

Aside from its general instructive nature, "On the Sub-Zero Beat Frequency" is especially significant to the GW Student because it tells of the work of our own Dr. Leer, one of the world's foremost Heterodynamicists.

J. S. Shreve
B. S., Physics, '57

Ed.: *After considering it for publication, publishing it (on page 24), and reconsidering it, our only comment is "Aw c'mon now."*

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If you haven't guessed it by now, that nonsense in the first paragraph was to entice you into reading the rest of this message. If you know where such a set-up exists, how about letting us in on the know?

Mecheleciv Magazine
The George Washington University
Washington, D. C.

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